Remarks

The Advisory Action mailed May 8, 2009 has been received and reviewed. Reconsideration and withdrawal of the rejections are respectfully requested. As a supplement to the previous response (submitted on April 27, 2009), the Examiner is requested to additionally consider the following.

The 35 U.S.C. §103 Rejection

The Examiner rejected claims 27 and 30 under 35 U.S.C. §103 as being unpatentable over Garcia et al. (U.S. Patent No. 6,464,765) and further in view of Williams et al. (U.S. Patent No. 6,786,994). The Examiner rejected claim 28 under 35 U.S.C. §103 as being unpatentable over Garcia et al. (U.S. Patent No. 6,464,765) and further in view of Williams et al. (U.S. Patent No. 6,786,994) and further in view of Shrewellus (U.S. Patent No. 3,027,331). These rejections are respectfully traversed.

Garcia et al. disclose a slurry containing solid particles in the slurry, whereas the present invention relates to a dental ceramic framework treated with a solution, wherein the metal salt or metal complex is soluble in the solvent. Furthermore, the amount of the metal ions in the solution is in the range of 0.01 to 7.0% by weight. As mentioned in Applicants' previous response, if a (porous) ceramic framework is treated with a solution, the solution will migrate into and colour the entire framework, especially for small dental pieces. This is in contrast to the slurry used by Garcia et al. The slurry (containing a huge amount of insoluble pigments) will not colour the entire framework.

Furthermore, Garcia et al., at best, suggests adding PEG 200 (Table 1) to increase the viscosity of the aqueous composition, and as a humectant (column 3, lines 51-58). The solution used in the present invention contains PEG having a Mn in the range of 10,000 to 50,000. The Examiner uses Williams et al. to teach PEG with a molecular weight of 100 to 40,000.

Using the solution according to the present invention, a uniformly coloured ceramic dental framework can be obtained showing less sintering deformation after firing. Thus, the objective problem to be solved can be considered as providing a shelf-life stable solution which

can effectively penetrate a ceramic framework without detrimentally affecting the deformation during firing.

To achieve this object, the solution has to be balanced in respect of viscosity and content of metal ions. As stated in Applicants' specification at page 7, lines 19-20, it is important that the solution used has "an adequate viscosity so that sufficient wetting of, and penetration into, the pores of the ceramic framework can be achieved." The slurry suggested by Garcia et al., even if modified by the PEG of Williams et al., is not suitable, as it contains a huge amount of solid particles. This solution cannot penetrate the ceramic framework, as discussed above.

Although Applicants have shown the importance of the presence of PEG in the solution and the impact on the final product, the Examiner has asked for a comparison of results showing the impact on the product of different molecular weights of PEG. Applicants conducted experiments using varying molecular weights of PEG, the results of which are described in the Declaration of Holger Hauptman submitted with the Amendment and Response dated April 27, 2009. Also, Applicants conducted experiments using varying chain lengths of PEG, the results of which are described in the accompanying Declaration of Holger Hauptman (dated May 28, 2009) submitted herewith.

Declaration of Holger Hauptman Dated April 27, 2009

In the first Declaration of Holger Hauptman, it is shown that the molecular weight affects the viscosity of the colouring solution and thus its ability to migrate into the pores of the ceramic framework. The use of PEG having a molecular weight outside the claimed range will lead to an inhomogeneous colouring of the ceramic framework.

Specifically, in the Declaration, it is shown that a solution comprising PEG having a Mn in the range of 10,000 to 50,000 in an amount of 2 to 8 % by weight has a viscosity below 30 mPas. Such a solution is useful to achieve the desired objective of "sufficient wetting of, and penetration into, the pores of the ceramic framework."

However, when it comes to penetration into a ceramic material, each and every solution of PEG is not useful. Test bars (LAVA Frame – a commercialized presintered Zirconia blank)

were soaked with solutions containing different amounts and concentrations of PEG (Solution 1 = 6 % PEG 35,000; Solution 2 = 0.2 % PEG 1,000,000 and 2 % PEG 300,000; Solution 3 = 1 % PEG 35,000 and 1 % PEG 100,000 and 1 % PEG 300,000). The penetration of these solutions into the test bars was examined (see Comparative Tests, Exhibit A). The test results show that not each and every solution, showing a range of PEG molecular weights, is useful to achieve the objective of the present invention.

Although it may be difficult to see (depending on the quality of the copy being reviewed), Exhibit A shows that Solution 1 (containing 6 % PEG 35,000, within the claimed amount and molecular weight ranges of PEG) penetrated much further (approximately 3x) into the test bar than did Solution 2 (containing only much higher molecular weights of PEG, outside the claimed molecular weight range). Also, Exhibit A shows that Solution 3 (containing PEG 35,000 along and much higher molecular weights of PEG, outside the claimed range) penetrated into the test bar slightly more than Solution 2, but not as far as Solution 1.

Declaration of Holger Hauptman Dated May 28, 2009

In the second Declaration of Holger Hauptman, it is shown that the chain lengths, and hence, the molecular weights, of the PEG, affects the homogeneity in colour of the ceramic framework upon migration of a solution into the pores of the ceramic framework. The use of PEG having chain lengths and molecular weights outside the claimed range (sample numbers 47-51 and 53) was compared to the use of PEG 35,000 (sample number 52). In the Declaration, test discs (LAVA Frame – a commercialized presintered Zirconia blank) were soaked with solutions containing different chain lengths of PEG and then treated using LAVA sintering protocol (IFU = instructions for use). It is shown that a brownish boundary is visible in all samples except for sample number 52 (which includes a PEG having a molecular weight within the claimed range). In sample number 52 there is a smooth transition between the white and coloured areas giving a more homogenous appearance.

Thus, even if it is assumed that the PEG is driven off by firing, the resultant product will be affected by the use of the PEG, its molecular weight, and its amount. It is respectfully

submitted that there is no motivation to alter the amounts of a couple of ingredients and the molecular weight of one of the ingredients of the slurry of Garcia et al. to arrive at the solution of the present invention. Withdrawal of the rejections based on Garcia et al. is respectfully requested.

Summary

It is respectfully submitted that the pending claims are in condition for allowance and notification to that effect is respectfully requested. The Examiner is invited to contact Applicants' Representatives at the telephone number listed below if it is believed that prosecution of this application may be assisted thereby.

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